

White Mountain National Forest



United States
Department of
Agriculture

Forest Service

Eastern
Region



Monitoring and Evaluation Report 2009

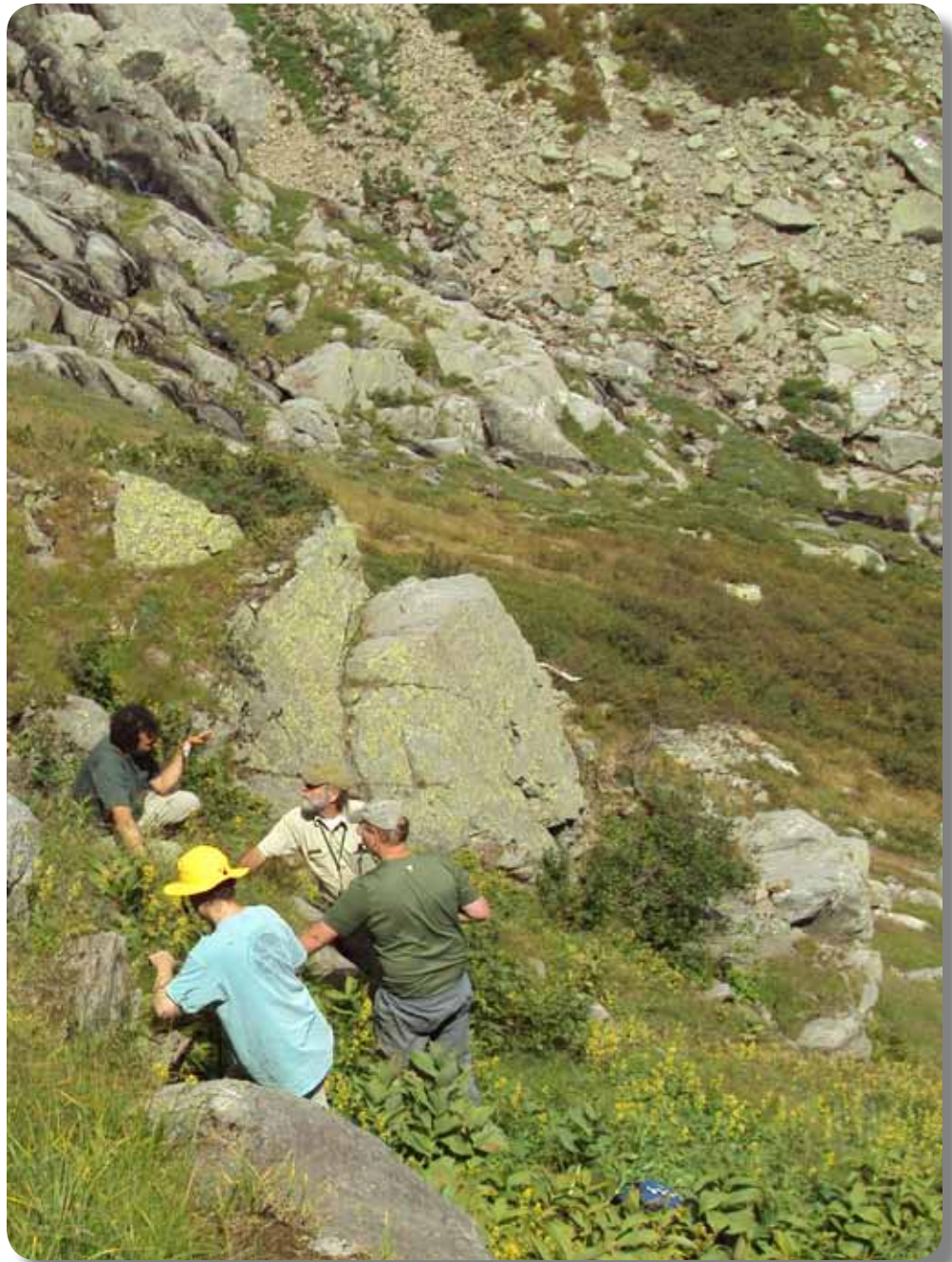


Figure 1 (Cover). Plant monitoring in Tuckerman Ravine. Photo courtesy of Diane Allen.

**This document is available in large print.
Contact the
Forest Supervisor's Office
603 536-6100
TTY 603 536-3665**

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Printed on Recycled Paper



Contents

From the Forest Supervisor	4
Introduction	6
Required Monitoring.....	7
Objective Attainment.....	14
Standard and Guideline Implementation	22
Effects of Management Practices.....	35
Project Reviews	38
Other Monitoring.....	42
Literature Cited	53

From the Forest Supervisor

I am pleased to share with you the most recent White Mountain National Forest Monitoring Report, which summarizes many of our monitoring efforts in fiscal year 2009 (FY09). As in the past, this report considers how well we are implementing the management direction in the Forest Plan and what effects our management is having on natural, cultural, and social resources. We remain committed to looking at all of our programs, identifying what is working well and what isn't, sharing the results, and learning from all that we do.

This report shows that we continue to work toward meeting our Forest goals and objectives and most of the standards and guidelines evaluated in FY09 were being implemented and working effectively. As is to be expected when managing a large, complex landscape for multiple uses, there is always more that needs to be done and challenges arise. This report identifies three standards or guidelines that are not working quite as was expected when the Forest Plan was revised. I do not believe we need to amend the Forest Plan to modify any of this direction at this time for the following reasons (see Standard and Guideline Implementation section of this document for more details):

- While we have not implemented a personal use permit for recreational mineral collecting yet (Forest Plan p. 2-5, Recreational Mineral Collecting S-3), this report clearly indicates that the standard is appropriate. We will begin the process to establish a mineral collection permit and work with the public to implement it.
- The Heritage Resource guideline regarding data management (Plan p. 2-7, G-4) also remains appropriate. We are making considerable progress in our efforts to meet national standards. We will not have all legacy data input this Fiscal Year, but we will continue the work until everything is in the appropriate system, which is consistent with the intent of this guideline.
- We are meeting the intent of the slash retention standard (Plan, p. 2-29, Vegetation S-3) to keep nutrients on-site. However we will work with contractors to better disperse residual slash across the units to result in more evenly distributed soil nutrient levels, especially on low nutrient soils.

I find that the monitoring we did in FY09 and this report meet the intent of both the Forest Plan (Chapter 4) and the planning regulations at 36 CFR 219.

The Plan Record of Decision emphasizes that the Forest does not exist in isolation; it is part of larger state and regional landscapes, and our management affects surrounding communities and ecosystems. Forest Plan direction helps us make decisions within the context of broader ecological and landscape level considerations. However applying that direction is not enough. Some of the issues that face the forests of the northeast cannot be addressed by looking at just one particular property or jurisdiction. Concerns around climate change, invasive species, air quality, and watershed restoration require working across boundaries. Therefore, when I evaluate how well we are implementing the Forest Plan, I also consider whether we are working with our partners and others in the area to address landscape-scale issues. In FY09, we worked with many partners, state agencies, and others on key topics. A few examples include:

- Working with State Foresters and sharing data as they develop their strategic plans for managing forests across the states of New Hampshire,
- Working with state, federal, and non-government partners to track occurrences of non-native invasive insects and take measures to prevent their introduction and spread,
- Sharing information and ideas with many partners regarding climate change and how it should be considered in land management in northern New England, and
- Participating in advisory boards and working groups, such as the Keeping Maine's Forest's, New England Governor's Commission on Land Conservation, New Hampshire's Legacy Board, Good Forestry in the Granite State review team and many other local and regional efforts.

All of this cooperative work helps ensure our actions will contribute to sustainable management of resources and communities across northern New England and is a critical part of achieving Forest Plan goals.

I am proud of the efforts of our employees and the many volunteers and partners who make this ongoing monitoring and adaptation effort possible. Please let us know if you have any questions or concerns after reading the document.

Thomas G Wagner

Introduction

Effective monitoring and evaluation help the Agency and the public determine how well a Forest Plan is being implemented, whether Plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid. They help us improve our management and determine when we need to adjust desired conditions, goals, objectives, standards, and guidelines.

The White Mountain National Forest's Monitoring Plan (Chapter 4 of the Forest Plan) describes what we will monitor and what we expect to learn from that monitoring. The Monitoring Plan identifies several types of required monitoring, including monitoring of sustainability, outputs, services, and costs, management indicator species, objective attainment, standard and guideline implementation, and effects of management practices (pages 4-8 to 4-10). Our Monitoring Plan also identifies the need to conduct monitoring on a variety of topics or resources to evaluate resource conditions and ecosystem health, and help answer the question "Are we accomplishing the overall goals of the Forest Plan?"

Monitoring is not performed on every activity, nor is most of it expected to meet the statistical rigor of formal research. There is monitoring we do, such as construction and timber sale administration, that is difficult to summarize in a report like this, but that is still a valuable part of our land management efforts. Some monitoring is conducted weekly or annually, some is done at longer intervals to track changes over time, and other items are monitored when funds and staffing are available. Monitoring that is specifically required by law or regulation is always given the highest priority.

The annual monitoring report summarizes and, at scheduled intervals, evaluates monitoring results. It also provides the public and Forest personnel with updated information about Forest Plan implementation. Some monitoring leads to immediate conclusions while other topics require a decade or more of data collection to produce informative results. As a result, our annual monitoring report changes every year and the level of detail provided varies by topic.

Required Monitoring

The Forest Planning regulations (36 CFR 219) under which the WMNF Forest Plan was revised require that we monitor several factors related to the sustainability of timber harvest, the levels of outputs and services the Forest provides, and population trends and habitat relationships of management indicator species. While not all of these items need to be evaluated annually, they are covered in every monitoring report to demonstrate our commitment to meeting our responsibilities toward management sustainability, outputs and services, and management indicator species.

Sustainability

This section addresses topics in Table 4-02 of the Forest Plan. This year, we monitored the two annual items, restocking success and insect and disease levels.

Are lands adequately restocked following harvest?

Monitoring regeneration is a legal requirement to ensure adequate restocking of tree species following regeneration harvests such as clearcut, shelterwood seed cut, single-tree or group selection cut. Within five years following such harvests, we must certify that we expect an adequate number of seedlings to be established. We typically conduct a field survey about three years after the harvest.

Surveys are conducted by Forest staff as they walk through the harvested area. Typically, surveyors establish several sample plots and make visual observations as they walk throughout the area to see if desirable seedling species are present. In 2009, 1,607 acres were surveyed and all were certified as having adequate stocking.

Typically, our temperate climate ensures adequate restocking after regeneration harvests. Some portions of stands that are very wet, or areas with summer skid trails, may take longer to regenerate; however, these areas are usually a minor part of any harvested area, so the overall stand qualifies as being adequately restocked.

Figure 2.
Revegetating
clearcut from the
2001 Silver Sale.
WMNF photo by
Wayne Millen.



To what extent have destructive insects and disease organisms increased?

Monitoring destructive insects and disease organisms is required annually to track trends in insect and disease activity. The results can be used to determine when management action may be appropriate to control an outbreak.

The State and Private Forestry branch of the Forest Service, in Durham, New Hampshire, conducts an aerial detection survey over the WMNF annually. In FY09, about 6,000 acres of severe defoliation was observed on the south end of the Pemigewasset Ranger District near Rumney, primarily in areas with northern red oak. This defoliation was associated with an outbreak of Oak leafroller. This insect is native to our region and occasionally has population spikes which can result in mortality. The area will be monitored in FY2010 during the annual aerial survey, with follow-up ground inspections if there is still evidence of continued defoliation, to determine if any mortality is resulting.

Two other areas of scattered discoloration and mortality were observed on the National Forest, one east of Rumney and another north of Squam Lake. The former area was about 600 acres of foliage discoloration in northern red oak caused by the native oak leaf-tier. This insect is also native to our region. It is commonly found with the Oak leafroller and has similar population patterns and effects. This area will also be monitored in FY10 with aerial surveys and follow-up ground inspections as needed. The Squam Lake area was about 1,000 acres of scattered paper birch mortality from canopy dieback, likely related to the 1998 ice storm.

As mentioned in previous reports, there is continued concern about the potential risk from invasive pests, including emerald ash borer, hemlock wooly adelgid, Asian longhorned beetle, and balsam wooly adelgid, to name a few. The WMNF restricted the import of firewood to our campgrounds in FY09 in cooperation with the State of New Hampshire. Specialists feel this would be the most likely way an infestation of Asian longhorned beetle or emerald ash borer would arrive here. Hemlock wooly adelgid continues to gradually spread north, including an isolated incidence in Alton, New Hampshire. See the non-native invasive species discussion under Objective Attainment in this report for more information.

Outputs and Services

Appendix B of the Forest Plan identifies expected outputs and accomplishments for the first decade, as well as some limits. Most of these measures can be found in the resource goals and objectives in Chapter 1 of the Plan. Annually, this report discloses actual accomplishments for volumes and practices identified in Tables B-02 through B-04. Table 1 shows the status of each measure for fiscal year 2009 and to date for the first decade of Plan implementation.

Aquatics

A shift in focus from planning single-resource projects to integrated resource projects resulted in fewer miles of stream restoration in 2009, but expected activities in future years should enable us to remain on-track to meet proposed outputs for the first decade. The level of fish passage restoration proposed in the Plan (Table B-04) was only covered replacing culverts on larger streams with bridges. Crossings of that size are limited and replacement is expensive, so the

Table 1. Outputs and Services.

Activity or Product	Unit of Measure	Estimate for the First Decade	FY09 Accomplishment	First Decade Accomplishment, FY06-FY09
Aquatics				
Stream habitat restoration	Miles	30	1.6	8.6
Restore fish passage	Road crossings	10	2	5
Fire Management				
Wildland fire managed for resource benefit	Fires	4 – 8	0	1
Forestry				
Volume Sawtimber Harvested	MMBF	137	5.0	20.3
Volume Pulp Harvested	MMBF	106	6.4	25.4
Volume of Timber Sold	MMBF	240	12.1	37.9
Even-aged regeneration harvest	Acres	9,400	182	1085
Even-Aged Intermediate harvest	Acres	5,600	506	1759
Uneven-aged Harvests	Acres	19,300	539	3621
Total harvest	Acres	34,300	1227	6465
Recreation				
Net increase hiking trail construction	Miles	Up to 25	0	0
Net increase snowmobile trail construction	Miles	Up to 20	0	.2
Net increase developed campground sites	Sites	Up to 32	0	0
Net increase backcountry facility capacity	PAOT	Up to 40	0	0
Soils				
Improved Watershed/Soil Conditions	Acres	At least 250	35	115
Transportation				
Road construction	Miles	10	0	2.4
Roads reconstructed	Miles	70	3.2	25.7
Roads decommissioned	Miles	5 - 40	0	0.13
Unauthorized roads decommissioned	Miles	N/A	4.4	6.6

projection was to average one per year. However in recent years, inventories and research have shown that restoring passage on smaller streams is important to fish populations. The Forest Service has begun assessing and replacing culverts on smaller streams with larger culverts or arches that will allow fish passage. We are therefore likely to exceed the projected output for the first decade in the next few years.

Fire Management

In 2009 there were no fires on the Forest that met the criteria to be considered as wildland fire use events.

Forestry

The harvest acres for the First Decade Accomplishment have been updated with more accurate data than used in previous reports. The most significant correction was a 500 acre typographical error that over-reported even-aged regeneration harvest acres in 2006. We have also added a summary of total volume sold and acres of uneven-aged harvest based on internal and public interest in this information.

Similar to previous reports, our outputs are lagging substantially behind Forest Plan expectations. Harvested acres are a function of how much timber we are selling and market conditions for our timber sale purchasers. Our volume sold is about half the allowable sale quantity in the Forest Plan. The Forest sold the volume that we were funded to produce in 2009. However, budget allocations have not been high enough in recent years to enable us to meet the ASQ. The allocations are based on national priorities for where funds are most needed each year and our capability to complete project environmental analyses and prepare and award timber sale contracts. In recent years, national priorities have been elsewhere and our capabilities have been limited somewhat by administrative and legal challenges of our projects. Our intent is to gradually increase the volume sold so we can better meet Forest Plan objectives, such as providing a sustained level of quality sawlogs to local businesses and enhancing important wildlife habitat.

The last several years have been some of the most difficult in memory for the forest products industry. The recession dramatically decreased the demand for wood products, with the exception of wood and biomass used for heating and electrical generation. The latter markets are expanding. With the increased emphasis on mitigating climate change, this trend will likely continue. Sawtimber markets improved slightly late in the year.

Recreation

The management objectives for recreation allow for limited construction or expansion of trails and facilities in order to maintain the overall recreational experience, minimize resource effects, and keep a system that it is feasible to take care of over time. In FY 2009, our emphasis was on maintaining and repairing existing facilities and trails, including trail relocations to make them safer or stop negative impacts to resources.

Soils

Our annual accomplishments, which included stream crossings and work on hiking and snowmobile trails to improve drainage and minimize erosion potential, are on target with those predicted in the Forest Plan.

Roads

No new road construction occurred this year. Road reconstruction was slightly lower than the expected annual average, keeping the Forest within the levels analyzed for in the Forest Plan FEIS. Decommissioning of Forest Service system roads has been limited, largely because it is evaluated in concert with other management actions, and the system roads in the areas we have entered in the last four years are necessary for long-term management. Decommissioning unauthorized roads is a regular part of our management. These are roads that exist on the ground, but are not part of the official WMNF transportation system and are not needed for long-term management according to project-level transportation analyses. In some cases, decommissioning involved physically closing the road to traffic, removing drainage structures, and seeding it in. For other roads, past management actions or nature have closed the road and the decommissioning was simply updating our database to reflect that the road is no longer open and will not be available for future use. Decommissioning these roads was not listed in Appendix B of the Forest Plan, but it is an important part of reducing resource impacts and managing our transportation network, so we have added it to this section of the annual monitoring report.

Management Indicators Species (MIS)

Table 4-04 of the Forest Plan includes a question: "Are population trends of the MIS consistent with those projected under the Plan?." The Forest has long had in place a bird monitoring protocol that will help answer this question for mature forest MIS (scarlet tanager and blackburnian warbler), but we also wanted a new protocol specific to early successional MIS (chestnut-sided warbler and magnolia warbler). A pilot protocol was developed and tested in 2007. Based on lessons learned from that pilot year, an improved protocol was implemented for the first time in 2009.

The protocol consists of a series of three consecutive bird point counts conducted in recent (<10 years old) clearcuts during the month of June. Each of the three point counts is five minutes long, for a total survey time of 15 minutes. All birds seen or heard within the clearcut are counted. In 2009, the Forest's vegetation accomplishment database (FACTS) was sampled to obtain 84 clearcuts less than 10 years old. The average clearcut size was 14 acres and total habitat surveyed was just over 1,200 acres.

Surveyors noted 1,246 observations of 57 species. The four species with the most observations were chestnut-sided warbler (479), common yellowthroat (226), mourning warbler (108), and white-throated sparrow (106). All of these species are considered good indicators of early successional habitats.

To identify a baseline for future trend analysis, the data was analyzed further using methods described in Donovan and Alldredge (2007). The data was first sorted to identify species that had been observed in at least 10 percent of

the clearcuts. These species were alder flycatcher (ALFL), American redstart (AMRE), American robin (AMRO), cedar waxwing (CEDW), chestnut-sided warbler (CSWA), black-and-white warbler (BAWW), common yellowthroat (COYE), magnolia warbler (MAWA), mourning warbler (MOWA), rose-breasted grosbeak (RBGR), ruby-throated hummingbird (RTHU), dark-eyed junco (SCJU), and white-throated sparrow (WTSP). Then detections of these species were sorted by species, site, and replicate and entered into the program PRESENCE (Hines 2006). PRESENCE performs a number of calculations that result in two key parameters: the likelihood that a clearcut is occupied and the probability of detection (i.e., assuming a bird occurs in a clearcut, how likely is it to be recorded?). Based on this, the average abundance of a species in a clearcut can be estimated, as well as the total abundance of a species over all clearcuts. Table 2 summarizes PRESENCE outputs.

Table 2. PRESENCE outputs for 13 species monitored in WMNF clearcuts, 2009.

Species	p = prob. of detection (SE)	95% confidence interval	Average abundance/unit (λ) (SE)	95% confidence interval	occu-pancy (ψ) (SE)	95% confidence interval	Total abundance N (SE)	95% confidence interval
ALFL	0.7791 (0.0477)	0.6857-0.8725	0.38 (0.07)	0.24-0.51	0.3133 (0.0465)	0.2223-0.4044	31.58 (5.68)	20.44-42.72
AMRE	0.6167 (0.0704)	0.4787-0.7547	0.31 (0.06)	0.18-0.44	0.2657 (0.0474)	0.1729-0.3585	25.94 (5.42)	15.33-36.56
AMRO	0.2798 (0.1401)	0.0053-0.5543	0.16 (0.08)	0.00-0.31	0.1444 (0.0682)	0.0107-0.2782	13.10 (6.70)	-0.03-26.24
CEDW	0.1706 (0.0904)	-0.0065-0.3478	0.56 (0.29)	-0.01-1.12	0.4277 (0.1652)	0.1040-0.7515	46.89 (24.24)	-0.63-94.41
CSWA	0.8010 (0.0228)	0.7563-0.8457	2.28 (0.17)	1.95-2.62	0.8981 (0.0174)	0.8640-0.9322	191.84 (14.35)	163.72-219.96
BAWW	0.4728 (0.0791)	0.3179-0.6278	0.38 (0.08)	0.22-0.54	0.3145 (0.056)	0.2036-0.4254	31.72 (6.93)	18.13-45.31
COYE	0.5723 (0.0465)	0.4811-0.6634	1.46 (0.16)	1.13-1.78	0.7669 (0.0383)	0.6918-0.8420	122.32 (13.81)	95.25-149.39
MAWA	0.6396 (0.0691)	0.5042-0.7751	0.29 (0.06)	0.17-0.41	0.2529 (0.0461)	0.1625-0.3433	24.49 (5.19)	14.33-34.66
MOWA	0.6083 (0.0521)	0.5061-0.7105	0.67 (0.10)	0.48-0.86	0.4893 (0.0500)	0.3912-0.5874	56.44 (8.23)	40.31-72.57
RBGR	0.4439 (0.1158)	0.2169-0.6708	0.16 (0.05)	0.06-0.27	0.1486 (0.0457)	0.0591-0.2382	13.52 (4.51)	4.68-22.35
RTHU	0.2312 (0.0772)	0.0798-0.3826	0.76 (0.25)	0.26-1.25	0.5301 (0.1176)	0.2995-0.7607	63.42 (21.03)	22.2-104.645
SCJU	0.4029 (0.0982)	0.2104-0.5955	0.27 (0.08)	0.12-0.42	0.2355 (0.0584)	0.1190-0.3480	22.34 (6.4)	9.79-34.88
WTSP	0.5982 (0.0556)	0.4893-0.7071	0.61 (0.09)	0.43-0.79	0.4568 (0.0511)	0.3567-0.5570	51.27 (7.9)	35.78-66.76

Since only one year of data exists, no trend analysis can be completed yet, but some points can be highlighted:

- The species include a fairly diverse range of birds, from those that are strongly tied to early successional conditions like the chestnut-sided and mourning warblers, to species like the American redstart and black-and-white warbler that often are found in more mature forests that may have a shrubby component. Since one of the Forest Plan goals is to provide a diversity of habitat conditions, this range of species occurrence is a positive reflection. Clearcuts on the WMNF develop into young forest that provides habitat not only for species that exclusively use early successional conditions, but also for some mature forest species that like shrubby understory conditions.
- This model is based on two factors: the probability that a particular site is occupied by a bird and the probability that the bird is detected. The probability of detection (p) values are above 75 percent for two species (alder flycatcher and chestnut-sided warbler) and above 50 percent for more than half of the species, indicating observers were able to detect most birds. Derived occupancy rates were also above 75 percent for two species (chestnut-sided warbler and common yellowthroat), indicating regenerating clearcuts on the WMNF are utilized well by these species.
- Average abundance per site surveyed was highest for chestnut-sided warbler, the target MIS for regenerating hardwoods. This helps validate that habitat created on the WMNF provides suitable conditions for this species and many other species that use regenerating hardwood forest. Magnolia warbler had a much lower average abundance. However, although magnolia warbler will use regenerating hardwoods, it was chosen to represent regenerating softwoods. There were no clearcuts to regenerate softwoods, so it's not surprising that it would be less prevalent.

This survey is scheduled to be implemented in odd-numbered years, with the next year of data collection planned for 2011.

Objective Attainment

Forest Plan objectives are specific steps or expected accomplishments designed to move the Forest toward our Forest Plan goals. Each year, we examine several of these objectives to determine whether we are progressing as expected toward achievement. If we are not moving toward objective attainment, we evaluate why not and whether that indicates a need to change our management or the Forest Plan.

Geologic and Mineral Resources

Forest Plan, Page 1-6, Recreational Mineral Collecting

The potential for a recreational mineral collecting site meeting Americans with Disabilities Act (ADA) standards will be assessed and, if feasible, constructed.

While an assessment of all possible sites has not been done, sites suitable for recreational mineral collection are being evaluated when they are located in a larger project area. For example, the Four Ponds project interdisciplinary team visited the Pingree Ledge quarry site to evaluate the feasibility of improving site access and parking and to assess whether the trail could be upgraded to meet the Universal Accessibility standards. Because of several steep grade pitches (over 20%) and an uneven treadway, it does not currently meet Universal Accessibility standards. The team determined that upgrading the site to meet ADA standards would require such extensive work and trail relocation that it would result in undesirable resource impacts and be prohibitively expensive. For individuals that have difficulty accessing this site, there is a nearby private mine that provides vehicle access to collection sites and has similar rocks and minerals.

Heritage Resources

Forest Plan, Page 1-6

The Forest Service will develop partnerships with local historical societies, colleges, and universities to accomplish program goals.

Throughout the federal land management system cultural resource managers are tasked with identifying, evaluating, preserving, protecting, interpreting, and sharing information about historic properties and themes related to federal lands. Over 1,300 known historic and prehistoric sites lie within the boundaries of the White Mountain National Forest. Heritage Program staffing often does not meet the need for accomplishing this daunting workload. To help achieve program goals, Heritage Program staff work internally with “paraprofessionals,” Forest Service specialists in other fields who receive training in cultural resource management and devote a portion of their time to cultural resource surveys. Externally, the Heritage Program works with Plymouth State University to pursue partnerships in education, curation of artifacts and historic documents, and historic preservation. The Forest works with private not-for-profit groups such as WhiteMountainHistory.org to convey information about the Forest’s history and an historic preservation message to the public through the vehicle of the internet. Heritage staff meet regularly with representatives of local

Historical Societies and civic groups to identify opportunities for stewardship and education. All of these partners are critical to better meeting our Heritage Program goals.

Figure 3. White Mountain and Green Mountain/ Finger Lakes National Forest heritage staff, along with partners and volunteers, monitor and maintain the Cobb Cemetery in Hart's Location as part of the Passport in Time program. WMNF photo by Karl Roenke.



Non-native Invasive Species

Forest Plan, Page 1-8

Prevent non-native invasive species (NNIS) not currently on the Forest from becoming established.

No NNIS insect species are known to occur on the Forest, although range expansions have brought hemlock woolly adelgid, Asian long horned beetle, and emerald ash borer to within 200 miles of the Forest boundary. Preventing establishment of these species depends on limiting the potential for them to be transported here and detecting any occurrences early enough that they can be eradicated quickly. In 2009, the State of New Hampshire and the Forest worked collaboratively to enact a ban on the transport of out of state firewood onto the White Mountain National Forest and State of New Hampshire campgrounds, parks and forests. Two training programs were held on the Forest to ensure that Forest staff, campground hosts, and campground concessionaire staff understood the invasive insect issue, the intent of the firewood ban, and how to properly identify Asian long horned beetle (ALB) and emerald ash borer (EAB).

With the assistance of the NH Department of Agriculture, NH Department of Resource and Economic Development, and USFS Forest Health Protection staff, various early detection efforts for both ALB and EAB were implemented. The State of NH deployed 'purple sticky traps' baited with an attractant for EAB in campgrounds along the Kancamagus Highway. These traps were collected and specimens processed by the State. A variety of common and unusual insects were found, but no evidence of EAB was discovered in any of the traps.



Figure 4 (left above). Asian longhorned beetle damage in Worcester, Massachusetts. Figure 5 (left below). Asian longhorned beetle. Figure 6 (right). Setting a trap for emerald ash borer at a Forest campground. So far, neither of these invasive species has been detected on the White Mountain National Forest. Figures 4, 5: Michael Bohne, USFS; Figure 6: WMNF photo by Chris Mattrick.

USFS Forest Health Protection and WMNF staff conducted ground detection surveys for ALB in 24 developed campgrounds on the Forest. Working with the campground reservation system contractor we were able to determine what campgrounds had received visitors from zip codes in the Worcester, MA area (the closest and largest ALB infestation in the country). Ground detection efforts were focused on campgrounds and campsites that been used by people from these areas. The surveys involved inspection of firewood, downed logs, trees for the distinctive exit holes and other signs of infestation. No indication of ALB presence was discovered at any monitored site.

No specific monitoring for hemlock woolly adelgid (HWA) was conducted in 2009. Forestry, wildlife and botany staffs are familiar with the signs of infestation and spend considerable amounts of time on the ground during the field season. To date, no signs of HWA infestation have been observed at any location on the WMNF.

Early detection monitoring efforts for species will continue on an annual basis. USFS Forest Health Protection staff are planning to conduct tree climbing surveys for ALB in several WMNF campgrounds in 2010.

Recreation

Forest Plan, Page 1-13, Recreation

Current development levels in the backcountry will be maintained or lowered where appropriate.

Efforts such as implementing the 2006 New England Wilderness Act and 2008 Recreation Facility Analysis, and conducting facility site condition surveys have helped to guide management in the backcountry. Consideration of the development level of a site includes looking at all the constructed features (facilities, trails, bridges, signs) and the level of management presence. When safety, resource, or maintenance concerns at a site indicate work needs to occur, a project is designed to address the concern while maintaining or reducing the development level, as appropriate.

Numerous projects were completed in FY 2007 - 2009 in which the development level was maintained or lowered:

- Native tent pads were constructed at Fourth Iron Tentsite to replace dilapidated tent platforms, maintaining the development level.
- At Rattle River Shelter a new mouldering toilet replaced the pit toilet, improving resource conditions while maintaining the development level.
- Blue Brook and Spruce Brook Shelters in the Wild River Wilderness were removed and native tent pads were constructed in their place, reducing the development level at these sites.
- The Madison Gulf Bridge was reconstructed in the Great Gulf Wilderness. This bridge was reconstructed in-kind, retaining the current development level.
- In the Pemigewasset Wilderness, the Wilderness Bridge was removed due to safety concerns. This project also closed 0.7 miles of trail that is no longer needed to access the bridge and removed a second, smaller bridge. With these three constructed features removed, the development level of this area is greatly reduced which resulted in a change in the Wilderness Zone from most to least developed (Zone D to Zone A).
- At the Sawyer Pond Tentsite, tent platforms were reconstructed. This site is very popular; the reconstruction of these tent platforms will continue to concentrate visitors to one area around the pond, maintaining the development level of this area.

As issues are identified and projects are proposed, it is important that the Forest designs projects and monitors the results to ensure we avoid development creep in the backcountry.

Forest Plan, Page 1-13, Developed Recreation.

Campgrounds and picnic areas will have lower site densities than private facilities, with ample screening between sites and more immediate access to other Forest recreational activities.

In many campgrounds, maturing trees are becoming safety hazards. The Settlers Vegetation Management Project on the Androscoggin Ranger District



Figure 7. Forest Service employees dismantle old suspension bridge in the Pemigewasset Wilderness. WMNF photo by Tom Giles.

was initiated in 2006 due to the age of the forest stands in which Dolly Copp and Hastings Campgrounds are located and the danger of falling trees. During 2009, a large number of hazard trees were removed to protect visitors and small patch cuts were created to promote softwood and paper birch regeneration in Dolly Copp campground. In Hastings Campground, the whole overstory of white spruce was removed. The spruce plantation was created by the Civilian Conservation Corps in the 1930s. Due to the age of the stand, the soil type (which is not ideal for softwoods), and a fungus infestation, mortality was high. It was determined that removal of 15–20 percent of the trees (those that were most hazardous to campers) would make the remaining stand highly susceptible to wind throw. Therefore it was decided that for the safety of the forest visitor all the trees would be removed, leaving a young understory. With the need to meet public safety, we chose to lessen screening between sites temporarily in these campgrounds until the understory vegetation grows up. The issue of aging timber stands and potential safety risks will continue to develop in other WMNF campgrounds. Although screening may be temporarily reduced to protect public safety, all reasonable measures will be taken to protect or restore screening.

This objective remains an important item for the Forest to monitor as we move forward with future potential campground and day use area changes.

Forest Plan, Page 1-14, Winter Motorized Dispersed Recreation

Allow for a net increase of up to 20 miles of new snowmobile trails.

Forest Plan, Page 1-14, Non-Motorized Dispersed Recreation

Allow for a net increase of up to 25 miles of new hiking trails, not including trails at ski areas operating under a Special Use Permit.

The Forest has over 1700 miles of hiking and snowmobile trails. During the Forest Plan revision there were questions about the need for such an extensive trail system, the effects of the trails on other resources, and the ability to adequately maintain the system. These objectives were intended to address concerns by preventing substantial expansion of the Forest trail system and to help the Forest focus on maintaining existing infrastructure. During project implementation over the last four years, there has been some confusion about what type of changes result in “new trails.” For example, does a short relocation of an existing trail around an unstable slope or wet area count as new trail? Does a trail on newly acquired land count as new mileage?

In FY2009, in order to bring clarity and consistency to our planning, implementation and monitoring of the Forest trail system, the Forest Supervisor outlined direction for meeting these objectives. This direction includes: net gains in trail mileage that will not count against trail mile limitations, net gains in trail mileage which will count against trail mileage limitations, and a process for Forest-wide coordination of new trail proposals

In 2010, a system for tracking the mileage added and removed from the Forest Trail System will be implemented, which will provide us the information needed to ensure we meet these objectives.

Soil Resources

Forest Plan, Page 1-16

Implement measures to minimize off-site movement of soil on Forest projects.

Determining whether this objective is being met involves monitoring Forest projects to make sure that Forest Plan standards and guidelines and State best management practices that are intended to minimize soil movement are being implemented and to evaluate whether they are effective in limiting off-site soil movement. In FY09, the soils program monitored several timber sales (Lower Loop, Trestle, Right Angle, Popple North, Mack Brook, and Fishhook Landing) and two prescribed burns (Breezy Point wildlife opening and under burning at the Right Angle Vegetation Management Project). This monitoring showed that the Forest has met this objective with recent projects. The results of the monitoring are described in more detail under Standard and Guideline Implementation and Effects of Management Practices.

Forest Plan, Page 1-16

Cooperate in further development of a till source model, land use history evaluation, and soil inventory specifically to support large-scale analysis of factors affecting soil quality.

In the summer of 2006, the Forest entered into a partnership with the Northern Research Station, Plymouth State University and Natural Resource Conservation Service to begin work on a Terrestrial Ecological Classification Phase Inventory that will enable us to develop a land history evaluation and soil inventory. Landtype phase mapping, representing the finest and most-resolute level of the National Hierarchy, has many benefits. This inventory will aid the White Mountain in managing resources. It will improve our ability to predict how a given acre is going to respond to a specific treatment or disturbance, providing basic information to support our decision-making process. In FY09, we accomplished 6748 acres of soil mapping, which is the first phase of this project. Unfortunately, the first phase of the project is taking longer than expected because of funding limitations, so it will continue past the projected end date of 2011. However the Forest and our partners remain committed to the end goal of a landtype phase inventory.

Figure 8. Joe Homer, NRCS, shows a soil test hole on the Northeast Swift project during a field day for the Research Experience for Undergraduates program at Plymouth State University. WMNF photo by Andy Colter.



Vegetation Management

Forest Plan, Page 1-17

Manage for commercial products using well-integrated prescriptions that protect biotic and abiotic resources and are compatible with the high level of recreational use on the Forest.

For the past few years, the Forest has moved to an integrated project analysis process for implementation of Forest Plan objectives. This process typically looks at natural resource, transportation, and recreation facility conditions and opportunities across larger areas of the Forest than in the past. During this process we consider ways to meet our objectives that integrate our activities and outputs. For instance, we may identify ways that a timber harvest can meet some wildlife habitat objectives while at the same time using timber receipts to restore watershed conditions.

For every project, we conduct an environmental analysis that considers public input, identifies alternative ways to meet the desired future condition for the area, and evaluates the potential for the project to impact a wide variety of physical, biological, and social resources. During these analyses, we ensure that resources such as soils, water, cultural sites, and plant and animals species will be protected. We also consider recreational facilities and uses in terms of reducing effects to trails, minimizing dual use of roads for snowmobiles and log trucks, or using timber receipts to improve recreational opportunities.

We occasionally hear concerns from members of the public about how proposed clearcuts and similar treatments will affect the scenery of a project area. As displayed earlier, there have been 1085 acres of even-aged regeneration harvests in the past four years. This includes patch clearcuts, stand clearcuts, seed tree seed cuts, and shelterwood seed (or "establishment") cuts. The mean opening size has been about 12 acres. Even though these treatments occur on roughly 0.03 percent of the Forest annually, our project analyses include computerized modeling to evaluate the visibility of even-aged regeneration harvests. We use this tool to help determine the size and configuration of clearcuts to reduce effects to scenery while still trying to move toward our wildlife habitat objectives for regeneration-age habitat.

Standard and Guideline Implementation

Standards and guidelines are the specific, technical direction for managing Forest resources. They determine what management actions may occur at locations across the Forest and guide our project activities. Each year, we examine several of these standards and guidelines to determine whether we are implementing them appropriately.

Air Quality

Forest Plan, Page 2-4, Air Quality

G-1 Air Quality Related Values (AQRVs), such as aquatic biota, vegetation, and water quality should be protected to the extent possible from adverse impacts related to air quality within the White Mountain National Forest.

Forest Plan, Page 3-12, MA 5.1 Wilderness, Air Quality

G-1 The Great Gulf and Presidential Range/Dry River Wilderness Class I Airsheds should be managed to protect air quality related values (AQRVs) such as visibility, vegetation, and water quality.

The WMNF Supervisor is the delegated Federal Land Manager (FLM) for the two Class I areas in the WMNF. As the FLM, the Forest Supervisor has responsibilities under the Clean Air Act to protect Air Quality Related Values in these two Class I areas. One of these responsibilities is to review and comment on Regional Haze State Implementation Plans. The Forest Supervisor has reviewed and commented on these plans for most New England States and New York. These plans require the states to participate in haze reduction efforts. The Forest Supervisor's comments were submitted to the states to assist them in making

Figure 9. The Forest's new nephelometer, a device for measuring particulate matter in the air, was displayed at the Forest Headquarters dedication in 2009. WMNF photo by Forrest Seavey.



reasonable progress over a period of decades toward restoring natural visibility conditions in the Presidential Range/Dry River and Great Gulf Wilderness areas. Through another Clean Air Act program, Prevention of Significant Deterioration, the Forest Supervisor reviews regional major new sources of air pollution, such as new electric generating facilities, to determine if they would have an adverse effect on AQRVs, especially visibility, in Class I wilderness areas. If a new source of pollution could cause an adverse impact, the FLM is required to comment to the air regulatory agency on how this new source could degrade AQRVs in the Class I areas. In this way, the WMNF meets guidelines to protect AQRVs and can provide information and be part of solutions to improve air quality over the Forest.

Fire

Forest Plan, Page 2-33, Wildland Fire

S-2 All ignitions must receive an appropriate management response (suppression or wildland fire use) according to the Fire Management Plan.

G-2 Fire suppression and prescribed fire impacts should be minimized by implementing Minimum Impact Suppression Tactics as described in the Interagency Standards for Fire and Fire Aviation Operations.

The WMNF provides initial attack suppression to all human-caused fires, fires outside management areas where wildland fire use is allowed, and those that threaten lives, values, or private property. In April of 2009, firefighters worked to extinguish a fire near the Kancamagus Highway, called the Olivarian Brook Fire. In addition to being human-caused, the fire was in a management area where wildland fire use, or fire for resource benefit, is not allowed. Suppression efforts using minimum impact tactics limited the fire's growth to 5 acres. Using the concepts of minimum impact and appropriate response, leadership assessed the values and risk associated with the fire, and devised a strategy to stop the spread of the wildfire to the south while monitoring it to the north. Smoke on the road was a concern, but fire spread to the north was not, as several natural barriers existed and current fire behavior combined with expected weather did not indicate risk of escape. Access to the north side of the river was limited. Therefore initial attack resources worked on the south side of the river, nearest the road. During the second operational period, firefighting resources were sent to the north of the river to ensure containment. The response to this incident followed all goals, standards and guidelines established in the Forest Plan. The decision was to use suppression tactics that allowed discretion for appropriate management and emphasized safety of firefighters and the public.

Geologic and Mineral Resources

Forest Plan, Page 2-5, Recreational Rock and Mineral Collection

S-3 Recreational mineral activities for personal use that involve limited surface disturbance are allowed through a permit, provided that the activities comply with Forest standards and guidelines.

The intent of this standard was to allow recreational mineral collection that causes a small amount of surface disturbance by instituting a permit system for such use that would ensure that collectors know the Forest standards and guidelines they are expected to follow to minimize impacts. Since the Forest Plan was revised, a personal use permit system for recreational mineral collecting has not been established. People continue to look for minerals for personal use, often digging in the soil at likely locations, and sometimes causing resource damage. Trees are being undermined and roots severed by mineral collectors at established sites and elsewhere minerals are collected on the Forest.

At the Deer Hill fee site, collectors must sign a permit that lists the rules for recreational mineral collecting on it. Monitoring at Deer Hill shows that most people follow the permit requirements, and impacts to other resources are less than at places where collection is occurring without a permit.

A permit system needs to be created and implemented so that mineral collectors can be more effectively educated and held accountable for the terms and conditions outlined in the permit. A personal use permit system would allow recreational mineral collecting activity within a defined set of parameters, reduce adverse effects to natural resources, and meet this standard. Without a personal use permit system in place, it is difficult to implement an effective recreational minerals program on the White Mountain National Forest.

Figure 10. A fourth grade class collects minerals at Lord Hill. WMNF photo by Elaine Swett.



Heritage Resources

Forest Plan, Page 2-7, Heritage Resources

G-2 The Forest Service should curate its heritage resource collections and associated records in accordance with Federal standards (36 CFR 79), and through consultation with SHPO, ACHP, and other interested parties.

The Heritage Program, with the help of volunteers from WhiteMountainHistory.org, began the process of evaluating the body of historic documents housed at the WMNF headquarters. Through this effort, we identified documents that are used regularly by Heritage staff and need to be kept at the Forest headquarters, and documents used rarely but of potential value to other historical researchers and students that could be kept elsewhere. Negotiations are underway with the White Mountain Institute at Plymouth State University for the permanent curation of those materials. Evaluation of the Forest's collection will continue in future years.

Forest Plan, Page 2-7, Heritage Resources

G-4 Heritage inventories and resulting data should meet current national guidance and professional standards and should be maintained in the Forest Service's corporate database and mapping systems.

Considerable progress has been made in the past three years (2007 – 2009) in entering historic and prehistoric site and project survey data into the national Forest Service database and GIS. All known historic and prehistoric sites on the Forest have been entered into Infra at the core data level and all sites have been plotted as points in GIS. Priority Heritage Asset site records will be expanded upon in future years. Survey (event) data for 2009 was entered into Infra during 2009. National standards state that all legacy event data will be entered into Infra by the end of FY2010. Efforts are underway to gradually enter legacy data stretching back more than 30 years, but it will several years before the backlog of legacy event data for the WMNF currently not entered in Infra is all entered.

Rare and Unique Features

Forest Plan, Page 2-14, Small Whorled Pogonia

S-2 Evaluate projects with ground-disturbing activities to determine the potential for small whorled pogonia habitat to occur within the influence of the project area.

G-1 Known small whorled pogonia colonies should be evaluated to determine the potential for natural colonization of surrounding habitat that becomes functionally suitable over time. Actions may be taken that would benefit existing colonies or encourage additional colonization, e.g., removing trees to reduce canopy cover allowing more sunlight to reach the forest floor.

The Chase Hill Vegetation Management Project in Albany, NH was developed in part to enhance conditions for existing sub-populations and to encourage further colonization of small whorled pogonia (*Isotria medeoloides*) by opening the overstory and allowing more light to reach the plants. Although this population is extremely small, it is significant in two ways: 1) it is one of only two sites

on the White Mountain National Forest of this federally threatened species. This is the only federally listed species that is resident on the Forest, and 2) it is one of the most northerly occurrences of this species in New England.

This population has been monitored annually for many years. In 2006, the monitoring protocol was standardized to match the protocol being used by several other organizations and agencies at other locations of this species. The plants at this location are broken out into five sub-populations that are contained within five staked plots. In summer and fall of 2008, harvesting occurred around each of the sub-populations. No trees were harvested from within the sub-population plots, but a number of hand-selected trees were removed from the edge of each plot, primarily to the south and east.

One year following harvest, it is too early to make any broad generalizations about the effects of the activity on small whorled pogonia. The primary measure of beneficial effects is increases or declines in the number of reproductive individuals and total number of individuals within the plots.

Year	2006	2007	2008	2009
Total number of plants	29	30	37	46
Number of reproductive individuals	1	2	5	6

Although small whorled pogonia is notoriously fickle and naturally subject to wide swings in population numbers on an annual basis, there did seem to be increases in both measures in 2009. There are similar increases from 2007 to 2008 (prior to harvest activity) and these may be attributed to the natural falling of several large trees adjacent to two plots in 2008. The natural removal of these trees increased the sunlight penetration to the forest floor in each of these plots. Continued annual monitoring at these sub-populations will reveal the long term effect of the harvest activity on the population.

Figure 11.
Small whorled
pogonia (*Isotria
medeoloides*)
at the Chase
Hill Vegetation
Management
Project. WMNF
photo by Chris
Mattrick.



Recreation

Forest Plan, Page 2-19, Non-Motorized Dispersed Recreation, Education

G-3 Education messages should emphasize programs such as “hikeSafe” and “Leave No Trace” to foster personal responsibility for safety and to promote low impact in backcountry locations.

The White Mountain Conservation Education and Interpretive Plan for 2007-2012 emphasizes these programs. In 2009, the Forest sponsored over 35 campground interpretive programs, 8 Wednesday Night with a Ranger programs, and 50 school programs. Approximately 1/3 of those programs touched on “hikeSafe” and “Leave No Trace”.

The Forest has a designated Leave No Trace (LNT) coordinator who works to communicate the Leave No Trace values to our employees and partners. In the last 2 years she has utilized the LNT traveling trainers to offer 2-day “train the trainer” courses and LNT awareness workshops, reaching 30-60 individuals. In addition, the Forest has 10 LNT trainers or LNT Masters who provide LNT awareness workshops to organizations such as the Boy Scouts of America and the Student Conservation Association.

Two of our major publications, “On Foot” and “Backcountry Camping Rules,” also emphasize these programs.

The WMNF kiosk plan was created in 2006 to help ensure consistency in messages placed on our kiosks across the Forest. In 2009 the Forest worked to implement this plan across all three Districts. As a result, most kiosks now have consistent information. In accordance with this plan, the Forest developed a list of appropriate messages for specific types of kiosks. Both the hikeSafe and Leave No Trace are integral messages on our backcountry kiosks.

Figure 12. Forest employees completed a Leave No Trace “train the trainer” class. Photo courtesy of Alicia Pasquerillo.



Forest Plan, Page 2-20, Non-Motorized Dispersed Recreation, Overnight Facilities

G-2 Forest users should bear a share of management costs for overnight facilities and dispersed sites through continued use of volunteer programs, payment for services, recreation passes, and cooperative agreements.

There are 41 shelters/tentsites, 7 cabins and 7 AMC huts located on the Forest which provide a variety of overnight backcountry experiences. Of these facilities approximately 12 shelters/tentsites, 6 cabins and the 7 huts charge a fee, some of which goes to the direct maintenance of the site. The remainder of the facilities are maintained through a variety of other management options. Many visitors to the National Forest utilize recreation sites for which the Forest requires a recreation pass to be purchased. This program averages about \$500,000 of annual revenue, 95% of which is retained by the Forest to help fund operation and maintenance of sites, including backcountry facilities. Some of the backcountry facilities are operated and maintained by partners through cooperative agreements; the other facilities are maintained by volunteers and Forest Service staff.

This combination of management options requires the Forest user to bear a share of management costs and allows the Forest Service to continue to offer a wide range of high quality recreation opportunities.

Forest Plan, Page 2-22, Non-Motorized Dispersed Recreation, Rock and Ice Climbing

G-6 When issues are no longer effectively addressed by application of standards and guidelines, climbing plans for specific areas should be developed to minimize environmental and social impacts.

The Rumney Climbing Area has seen a dramatic increase in use in the last twenty years; there were 48 published climbing routes at Rumney Rocks in Ed Webster's 1987 guidebook *Rock Climbs in the White Mountains of New Hampshire* and are

Figure 13.
Tom Giles,
Pemigewasset RD
Assistant District
Ranger, leads a
public field trip to
discuss the Rumney
Rocks climbing
area project.
WMNF photo by
Forrest Seavey.



over 480 documented routes today. To address the issues and concerns resulting from increased use in this area, the Forest Service developed a Climbing Management Plan, the first on the White Mountain National Forest, with input from the local community, climbers and other interested parties. This plan is being used, along with standards and guidelines identified in the Forest Plan, to guide management of the Rumney Rocks Climbing Area. An Environmental Assessment for specific projects to reduce environmental and social impacts was completed in FY09. Trail maintenance with partners and other work identified in the Management Plan and the Environmental Assessment is scheduled to start in FY10 and will continue into the future.

Soil Resources

Forest Plan, Page 2-29, Vegetation Management

S-3 All tops and limbs from harvested trees must be scattered and left on-site when harvesting on outwash sands or soils shallow to ledge.

In FY09, the soils program monitored several timber sales (Lower Loop, Trestle, Right Angle, Popple North, Mack Brook, and Fishhook Landing). In all sale areas, slash was being returned to the site regardless of the soil type. In some units, including those on outwash and shallow to ledge soils, the scattering of slash was not as extensive as intended. If the skid trail ran through the harvest unit, the slash was often distributed along the skid trail, not throughout the unit. If there wasn't a skid trail through the middle of the site, slash was likely to be spread more evenly through the harvest unit. A District project review of Hillock sale showed that traditional chainsaw and skidder harvest methods are more likely to result in well-distributed slash than mechanical harvest methods. When the Plan is revised in the future, this standard could be clarified. Until

Figure 14. Main skid trail at Trestle sale on the Pemigewasset Ranger District in the summer looking towards the unit. Slash is layered to minimize rutting and compaction during implementation. WMNF photo by Andy Colter.



then, project design features should have a little more clarification on the amount of scattering of slash that is desired.

Forest Plan, Page 2-29, Vegetation Management

S-4 State of Maine and State of New Hampshire Best Management Practices must be met or exceeded.

Selecting the right operating season for the ground is a best management practice (BMP) for minimizing impacts to soil and water resources. The Hillock sale review in January 2009 highlighted the ideal ground conditions for winter logging that result when there is a solid layer of hard ice and snow. Climate change predictions suggest that, in the future, winters in northern New England will be warmer and precipitation will include more rain and ice and less snow (summarized in Johnson 2009). If these changes happen, logging on frozen ground will be harder to do and there could be a push to do more harvesting in the summer and fall. To help evaluate the need for and feasibility of a change in harvest season, effects to soil were monitored to be sure adverse impacts were not occurring because of the current season of harvest. In the active sales looked at in FY09, impacts matched what were analyzed for in the environmental assessments and were not detrimental. Currently there is no need to reevaluate season of harvest. Additional monitoring will be needed to ensure that winter operations are stopped when conditions are not suitable and that summer and fall harvest do not occur where they will cause adverse impacts.

According to the New Hampshire Best Management Practices "A Pocket Field Guide, 2004,"BMPs are designed "for the control and dispersal of water collecting on truck haul roads, skid trails, and log landings to minimize erosion and

Figure 15. A solid layer of snow and ice protect the ground during the Hillock sale's winter harvest. WMNF photo by Molly Fuller.



Figure 16. A clearcut unit on the Lower Loop sale, Androscoggin Ranger District. Following a winter harvest, slash is left to enhance soil productivity. WMNF photo by Andy Colter.



reduce sediment and temperature changes in streams.” In addition to season of harvest, BMPs such as water bars and slash in the trails to prevent compaction, erosion, and puddling were being implemented on reviewed sales when appropriate (see skid trail photo, below). These practices were found to be meeting the stated BMP objectives. No unacceptable erosion or soil movement was seen in harvest units in any sales and runoff water drained into locations suitable to capture sediment. All waterbars were functioning properly. Where slash was placed in the skid trails, there didn’t appear to be any active detrimental rutting leading to compaction. At Mack Brook, the main skid trails were revegetating, indicating no detrimental compaction. Where only a single pass was made with a skidder or other machinery, no trails were distinguishable.

When ground conditions indicate that logging cannot occur within the effects described in the environmental analysis, the BMP is to either halt harvest until conditions improve or leave areas untreated. In Popple North, several acres in two units were dropped from treatment because soils were too wet for winter logging and a small piece of another unit was not harvested because the terrain was unsuitable for skidding.

Vegetation Management

Forest Plan, Page 2-29, Vegetation Management

S-1 The maximum size of temporary openings created with even-aged management is limited to 30 acres.

According to our corporate resource data base, during the last 4-years there have been 88 even-aged regeneration harvests (stand clearcuts, patch clearcuts, seed tree seed cuts, and shelterwood seed cuts). The mean size was 12.3 acres. The maximum size was 30 acres, which occurred four times.

Wilderness

Forest Plan, Page 3-11, MA 5.1 Wilderness, General

G-1 Nonconforming structures should be evaluated for their historical and cultural values. They may be retained if 1) they do not threaten public safety or resource protection, 2) their cultural value is integral to that of Wilderness, or 3) they reflect Wilderness character.

Two shelter sites (Blue Brook and Spruce Brook) and two old administrative sites (Spider Camp and the Cold Weather Observatory Building) in the Wild River Wilderness were evaluated for their historical significance and determined to be ineligible for the National Register of Historic Places. All were removed to increase other wilderness values. A third shelter (Perkins Notch) was determined to be eligible. We are currently working with the New Hampshire State Historic Preservation Office (SHPO) to evaluate management options and determine what mitigation measures would be necessary if the decision is to remove the shelter.

Forest Plan, Page 3-12, MA 5.1 Wilderness, General, Wilderness Restoration

G-1 Restoration efforts should be site-specific and small scale, such as rehabilitating campsites or other sites impacted by recreation.

Numerous restoration projects have occurred across all six Wildernesses over the last four years. These projects have all been small-scale, ranging from rehabilitating fire scars from campfires to relocating, or even closing and rehabilitating, poorly located campsites.

Figure 17. One of the shelters removed from the Wild River Wilderness. WMNF photo by Justin Preisendorfer.



Wildlife

Forest Plan, Page 2-34 to 2-35, Nuisance Wildlife

S-2 At developed and backcountry sites with known problems, actions must be taken to alleviate the wildlife-human conflict. If these measures do not work, trapping or other measures may be used to remove the problem animal in coordination with state agencies. A process for addressing conflicts and recommended preventative measures are documented in the White Mountain National Forest Protocol to Avoid Wildlife-Human Conflicts.

G-1 Preventative measures and education should be used to minimize wildlife-human conflicts.

G-2 To the degree feasible, campers, hikers, and day-use visitors should be advised when there is a known nuisance wildlife problem in developed or backcountry areas near where they are recreating.

G-3 Information about proper food storage should be available to campers and recreationists at recreation sites.

The White Mountain National Forest is fortunate to be home to a healthy population of black bears. Most of the time, bears are content to avoid human visitors. However, bears will eat a wide variety of foods, including those brought by Forest guests. Bears are easily attracted to human food and can learn very quickly to associate humans with tasty treats, whether they are intentionally fed or accidentally discover unattended food or trash. Bears can be quite persistent and destructive in their attempts to gain access to coolers, backpacks, tents, and other places where food might be found. Unfortunately, once a bear has learned to expect a food reward from campers or hikers, it can be very difficult to change its behavior.

For the safety of our visitors, as well as for the bears, the Forest Plan includes a number of standards and guidelines drafted specifically to prevent or mitigate problem bear situations. These follow nationally accepted protocols of emphasizing public education (trying to change people's behavior rather than bear behavior) and keeping food away from bears (either by storing it in bear-resistant containers or properly hanging it where bears can't reach). When this fails, deterrents such as firing bear-scaring pyrotechnics or shooting rubberized buckshot are considered. As a last resort, State wildlife agency staff are consulted to trap and relocate a problem bear.

In the past, the Forest has had to address problem bears in developed campgrounds. Fortunately the placement of bear-resistant dumpsters and educational efforts have worked to mitigate many of these situations. However, in the summer of 2009, the Androscoggin Ranger District was confronted with a problem bear in the Madison Gulf area. Forest visitors reported several incidents, including a bear following hikers, dragging a backpack from a campsite, and pulling food down from a tree where it had been hung. In addition to informational signs that were posted at various backcountry campsites, recreation staff contacted partners at the Appalachian Mountain Club so they could alert hikers at Pinkham Notch Visitor Center and Madison Hut. Additional Forest Service staff were sent on backcountry patrols to reinforce the proper food

storage message with visitors. Strongly worded warning signs were posted at key locations. Assistance from New Hampshire Fish and Game Department (NHFG) bear specialists was requested and several attempts were made to scare approaching bears with pyrotechnics and rubberized buckshot. Although these efforts may have helped to reduce incidents during the summer season, scattered reports of hikers seeing a bear were reported in the early fall. Trapping and relocating a bear from the backcountry isn't practical. If the situation had persisted, the only other options would have been to close the area or identify and euthanize the bear. However, since it was fall by this point in time, Forest Service staff and NHFG, were hopeful that deterrents had helped sufficiently and that with colder weather approaching, the number of visitors would drop off sharply and the bear would start seeking a hibernation site. No further incidents were reported, but the area will be monitored in 2010 to make sure the bear doesn't return to its old habits.

In this situation, the District staff adhered to all of the appropriate standards and guidelines, including education and public information (G-1, G-3), alerting the public to known problem bear situations in a local area (G-2), taking action to alleviate the wildlife-human conflict (S-2), and coordination with the appropriate State wildlife agency (S-2).



Figure 18 (above). A black bear investigates a dumpster.

Figure 19 (right). Bear-proof dumpster of the type in use on the White Mountain National Forest.

Photos courtesy of Andrew Timmins, Bear Project Leader at NH Fish & Game.



Effects of Management Practices

In addition to knowing whether we are implementing the management direction in the Forest Plan, we need to know whether our management is having the effects we expected and that were disclosed in our environmental analyses. Each year, we examine a few specific practices and evaluate whether the outcomes have been what we expected.

Fire

In 2009, the WMNF burned 101 acres under prescription with the primary purposes of improving wildlife habitat and reducing hazardous fuels. Prescribed fires were completed under conditions that allowed for the each project's objectives to be met. A 21 acre burn was accomplished as part of a timber sale with the additional silvicultural objective of preparing the site for oak regeneration. Post burn observations concluded that mid-story fuels were reduced enough by the fire to increase light and reduce competition for seedling establishment. Additional monitoring will be needed after a few years of growth to determine if oak regeneration occurs and if seedlings survive.

Heritage Resources

In many cases, the Forest's management practices have the potential to affect historic and prehistoric sites. Recreation use and management activities and vegetation management projects have the greatest potential for impacts. In FY09, the Forest began developing a systematic set of monitoring and data recording protocols to more carefully monitor the effects of these management actions on cultural resources. This monitoring will document any change in the condition of historic and prehistoric sites over time as it relates to recreation and vegetation management. Through this effort we hope to identify effective management practices and agents of negative change, and to evaluate and refine project design criteria and mitigative strategies. Results will be reported periodically, starting once a couple of years of monitoring have been completed.

Soil Resources

As discussed in the FY08 monitoring report (page 39), there is potential for soil erosion and nutrient loss from prescribed fire, even though the effects of prescribed fire are typically of much lower magnitude than wildfires. In a typical prescribed fire, most of the site remains covered by organic matter and mineral soil aggregation is not changed. There may be some loss of surface soil organic matter from the Oi horizon, but there should not be any loss from the Oa horizon, in which calcium is stored. Some soil nitrogen will be lost when organic matter from any soil horizon burns, but nitrogen is not considered a limiting factor in productivity on the WMNF.

As part of a continuing effort to monitor the effects of prescribed fire on the WMNF, the effects to soil resources from the Breezy Point prescribed fire were monitored in FY09. As shown in the photos, the fast burn limited the loss of organic matter and prevented any erosion. No Oa horizon was consumed and

only some of the Oi and Oe horizons were consumed. These results indicate that no detrimental soil effects occurred.



Figures 20 and 21. Soil at Breezy Point on the Pemigewasset Ranger District before (left) and after (right) the prescribed burn. WMNF photos by Andy Colter.

Water Resources

Ore Hill Reclamation

Reclamation and monitoring efforts continue at Ore Hill, an abandoned lead, copper and zinc mine site on the National Forest near Warren, NH. Water quality was severely impacted by the abandoned mine for at least a mile downstream. Mine tailings and waste rock were removed from wet areas and stabilized in 2006 as part of an environmental clean-up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). However, an old mine adit (tunnel) was uncovered during the 2006 work; contaminated water continued to emerge from the adit and impact water quality in Ore Hill Brook. In 2009, an additional project was completed to reduce the levels of hazardous metals and acidity from this source. The innovative “passive” treatment system

Figure 22. Tailings area of Ore Hill site with constructed wetlands in foreground to provide passive treatment. WMNF photo by Sheela Johnson.



includes a sulfate reducing bioreactor and constructed wetlands, both of which use natural processes to neutralize the acid mine drainage and remove metals. Water quality is being monitored at the site in cooperation with Plymouth State University. The results show that water quality downstream of the site has markedly improved since the 2006 removal action. Based on a few sample dates after installation, the passive treatment system appears to be functioning as intended and removing metals. Further results of the most recent action will be reported after additional data collection and analysis. Successful reclamation of the site will meet the Forest Plan goal of maintaining or improving water quality to protect instream uses and the objective of reclaiming past mining sites using the best available science.

Effects of Recreation on Water Resources

Site monitoring at Diana's Bath, a developed recreation area, indicated that human waste and trash deposited near a stream posed a risk to water quality. The concentrated use and water-based activities in a relatively small area made waste management a particular concern. In FY08, improvements were made to the site, including installation of a vault toilet near the parking lot. Based on observations made in November 2008, the project was successful in reducing the amount of waste near the stream and alleviating a threat to water quality.

The Appalachian Mountain Club (AMC) monitors water quality near back-country huts to determine whether waste disposal systems are having an effect on surface water. Levels of nitrate, specific conductance and bacteria met all applicable water quality standards in 2009. There was no notable increase in any parameter downstream of huts relative to upstream samples, which is consistent with results from prior years. Management of waste disposal systems as specified in the AMC Huts Special Use Permit appears to be effective in protecting water quality.

Effects of Vegetation Management on Water Resources

The water monitoring program includes pre- and post-harvest monitoring in selected vegetation management project areas. Recently, the Forest has focused monitoring in the Stevens Brook and Swift River watersheds in New Hampshire and the Crooked River watershed in Maine. Pre-harvest data collection is underway. Stream reaches in these areas are generally in Proper Functioning Condition and meet water quality standards. Post-harvest monitoring will include water sampling and observation of Best Management Practice implementation and effectiveness. Results of this monitoring effort will be summarized in a future monitoring report once post-harvest data has been collected and analyzed.

Project Reviews

Every year, interdisciplinary teams and individuals go out and look at active and completed projects to determine whether the work was implemented in the way our environmental analysis said it would be, if we got the results we were expecting, and whether either additional action or a change in how we do things is needed. The results of these reviews can provide the basis for discussions of objective attainment, standard and guideline implementation, or effects of management actions in the annual monitoring report. However most of these project monitoring efforts include much more than what is described in other sections of this report. This section provides a brief summary of several project reviews to better show the breadth of monitoring being accomplished on the Forest.

Diana's Bath

In FY08, improvements were made to this site to address resource and safety concerns. An interdisciplinary review of improvements to the Diana's Bath site was conducted in FY 2009. Diana's Bath is within the roaded natural ROS class in MA 2.1. This project met one purpose of MA 2.1, to manage a high-use recreation area to meet acceptable social and ecological standards. The review determined that this project was appropriate for this ROS class because the improvements were designed to harmonize with the natural environment.

In the environmental analysis, prohibiting parking along the town road near the site was discussed as a connected action to limit parking and associated congestion and risks to pedestrians along West Side Road. The EA and Decision Notice presumed that cooperative law enforcement could address parking in excess of the 60-car capacity. However, during implementation, we learned that the Town had limited resources and ability to enforce parking on the adjoining

Figure 23. Diana's Bath, Saco Ranger District. WMNF photo by Terry Miller.



town road. It continues to be a concern because of high use levels during hot summer weather, and the challenge of how to manage use and minimize impacts. The Forest will continue to work with the Town of Conway to change the signage on the road. In lieu of that, the review team agreed to explore other methods for limiting use at this site.

The review team also discussed concerns with the new toilet facility having so much use that it may be reaching the point of over stressing the system. The installation of the toilet facility did result in a large reduction in human waste and toilet paper scattered about the site. Recreation staff have observed the public standing in line to use the facility prior to and after visiting the Baths almost every time staff was at the site. A larger toilet facility, or one toilet designed for higher concentrations of waste, might have been appropriate at this site. Currently the toilet is being pumped on a regular basis to handle the volume of waste.

Monitoring will continue at this site to ensure the site operates effectively. Ongoing compliance, cleaning, and collections will continue. A Limits of Acceptable Change (LAC) project has been initiated for this site to begin addressing concerns regarding carrying capacity at this site.

White Cairn Trail

Improvements to the White Cairn Trail consisted of building 30 rock steps in 2003 and another 20 rock steps in 2006 to improve and stabilize a 150-foot section of trail that steeply ascends an eroding, rocky gully. The on the ground results were similar to what was anticipated. However the review team noted that more rock steps are needed to mitigate remaining erosion problems. There is loose rock in places and it is a poorly defined route at the top of the project site. If this section of trail is not addressed, hikers may by-pass the trail and sensitive soils and plants in the area could be impacted. This additional work is planned for FY10.

Popple North Timber Sale

Much of the interdisciplinary team for the Popple Vegetation Management Project visited several harvest units, landings, and riparian areas after the sale was completed. In addition to the effects on soils, which were discussed earlier in this report, they looked at the success of prescriptions in meeting project objectives and effectiveness of mitigation for scenery, non-native invasive species, and water quality.

The review looked at a clearcut unit that was scaled back during planning to ensure that the opening that would be seen from Route 16 and from residences to the NE of Route 16 would be acceptable. Post-harvest field verification in 2007 showed that zero acres of opening were visible from key locations. The review team agreed this mitigation was effective in meeting scenic objectives for the project and Forest Plan guidance. Group openings along a road augmented the views and were meeting project objectives.

Proposed seeding of annual grasses to stabilize and revegetate disturbed areas had not been done at the time of the review. Reviewers identified one skid road that should be seeded and agreed that other areas are suitable for native



Figure 24. Ecosystem team field monitoring Popple timber sale. WMNF photo by Chris Mattrick.

revegetation and won't need seeding. Non-native invasive species are not known near this sale and no invasive species were seen on the monitoring trip.

Although a skid road used for five units had slopes of 20 percent, with a short pitch of 25 percent, the Forest soil scientist indicated that the high, dry location and water bars had been effective and there were no detrimental effects to soils.

Miles Brook and designated perennial streams were buffered an average of 25 feet from partial harvest treatments; clearcuts were 100 feet or more from these brooks. Partial harvest in stands along designated perennial streams retained a minimum of 70 square feet of basal area for an additional 75 feet beyond the no-harvest buffer. Equipment remained outside the riparian no-cut buffers except at the designated crossings to reach landings. Site-specific protections for intermittent streams were implemented as designed.

Although the Popple project decision was made under the 1986 Forest Plan (i.e. prior to the decision for Forest Plan revision), the review team determined that the project met standards and guidelines from the 2005 Forest Plan for soils, scenery, riparian habitat, and water resources. Plan guidance for other resources was not monitored on this trip.

Pemigewasset Timber Sales

Separate field reviews of the Hatchery, Hillock, and Mack Brook sales looked at harvest operations, BMP effectiveness, and concerns with dual use of roads and landings by logging equipment and snowmobiles.

BMPs to protect soil and water resources were being implemented properly and appeared to be effective. More detail is provided in the Objective Attainment and Standard and Guideline Implementation sections of this report.

At Hatchery and Hillock sales, damage of residual trees by logging equipment and skidded logs was noted in several units. When prescriptions call for retention of a relatively high basal area, it can be difficult for harvest equipment to move through the stand to reach the trees marked for removal without rubbing against trees that are meant to remain. Usually the resulting damage does not kill the tree, but it can affect its health and vigor. The review team discussed whether changing prescriptions to allow removal of more trees would still meet project objectives and agreed it depends on the objectives and conditions in each stand. Some residual tree damage is unavoidable during timber harvest, but where retaining a lower basal area would meet project objectives, it should be considered to minimize the potential for residual tree damage. Harvest is not allowed in the spring, when the bark of residual trees is most susceptible to damage.

Winter logging can present the challenge of dual use of roads and landings by logging trucks, machinery, and snowmobiles. The Hillock sale review found that safety signs warning snowmobilers of the harvest operations were in place, as required in the project decision. Snowmobilers were seen safely riding through the project area, including across an active landing, showing that dual use is feasible when everyone is alert. At another log landing, the review team determined it would be best to install orange snow fencing to identify a path for snowmobilers to use that would not be part of the active landing, in addition to the planned signing.

Other Monitoring

Every year, we conduct monitoring on a variety of topics to evaluate resource conditions, management needs, and ecosystem health. This section summarizes some of these monitoring activities. It provides a detailed evaluation where results are available and ready for analysis. For other monitoring, there is a simple discussion of what we are monitoring and why.

Botany

Cliff Plant Communities

In 2009, baseline data for Phase 2 of the cliff plant monitoring study was gathered. This study will help determine whether recreational rock climbing is negatively affecting native plants and plant communities on the Forest. Phase 1, completed in 2008, identified cliffs suitable for further study. Phase 2 is designed to collect detailed information on the impacts of rock climbing on the vegetation on, at the base of, and at the summit of cliffs. The impacts of trails or routes used by rock climbers to access cliffs also will be evaluated. This year's effort

Figure 25. Plant community on Parking Lot Wall at Rumney Rocks climbing area. Designated climbing route is in the center with no vegetation. Adjacent areas on both sides are vegetated. WMNF photo by Steve Johnson.



involved surveying multiple rock climbing routes at ten cliffs on the Forest and the trails or paths climbers use to access those cliffs. The Phase 2 process and protocols will be used to gather data at these sites every five years and compare that data to the 2009 data. Through this process of data gathering and comparison we hope to determine if impacts are occurring, at what levels, and in what locations. Any impacts could then be mitigated through management actions or temporary cliff/route closures if needed.

TES Plants

Every year project areas for large and small ground-disturbing projects are evaluated for the presence of federally-listed threatened, endangered, and sensitive (TES) plant occurrences and habitat. The 2009 surveys revealed six new Regional Forester Sensitive Species and 11 new occurrences of state-listed rare plants. The sites found through these surveys are added to the list of known occurrences of Regional Forester sensitive and state listed plant species that Forest staff and partners monitor each year to assess population health and trends. In 2009, 33 occurrences were monitored by volunteer botanists from the New England Wild Flower Society, Maine Natural Areas Program, New Hampshire Natural Heritage Program, Appalachian Mountain Club, New Hampshire Botanical Club and White Mountain National Forest staff. No significant changes were

Figure 26. WMNF Botanist Chris Mattrick and Doug Weihrauch of AMC look for *Sibbaldia procumbens* on the headwall, Tuckerman Ravine. Photo courtesy of Dave Govatski.



identified at any population with one important exception. The only location of *Sibbaldia* (*Sibbaldia procumbens*) in the eastern United States is located on the Forest and suffered a 50% loss in population numbers (from two plants to one plant). The reason for the loss is uncertain but appears to be natural. This is an alpine species which grows on the steep slopes below the Tuckerman Ravine headwall. Natural soil slumping may have dislodged the tap root of this plant from its supporting soil.

TES Plant Post Fire Monitoring on Rattlesnake Mountain

In May of 2008, the summit and upper ledges of Rattlesnake Mountain in Rumney, NH on the Pemigewasset Ranger District were the site of a wild-fire. Once the fire was extinguished, it was clear that much of the understory and some of the overstory woody vegetation had been burned off or killed. USFS botanists surveyed plants in the burned area in 2009 and expected to find increases in populations of the fire adapted species, but the degree of the increase was startling.

Douglas' knotweed (*Polygonum douglasii*) is a slender and inconspicuous member of the buckwheat family. Recent botanical survey efforts at Rattlesnake Mountain were unsuccessful in relocating this elusive annual. It is one of a dozen or so state or regionally rare plant species that grow on the rocky summit, exposed ledges, or enriched forests at this popular rock climbing venue. Rattlesnake Mountain has been the site of several wildfires in the past and numerous fire adapted species and natural communities have developed. For another rare species, piled-up sedge (*Carex cumulata*), population numbers seem to be directly tied to fire events.

Figure 27.
Aureolaria
pedicularia
var. intercedens
flourishes on
Rattlesnake
Mountain
following a 2008
wildland fire.
WMNF photo by
Alice Schori.



Piled-up sedge was found in multiple locations throughout the burned area and in many previously shaded locations where it had not been documented before. Population numbers were up dramatically. A survey in 2006 located only 30 plants, but the 2009 survey found well over 1,000 plants with multiple flowering culms on each. The benefit was not limited to this species. Another state rare species, fern-leaved false foxglove (*Aureolaria pedicularia* var. *intercedens*), with its bright yellow flowers was clearly visible throughout the burned area. Prior to the wildfire it occurred only in the most exposed ledge-top locations, but was now found in many previously forested sites. The greatest botanical discovery during the post fire surveys was multiple sub-populations of Douglas' knotweed. Whether these plants grew in response to the fire or were simply 'daylighted' by removal of competing vegetation is unclear, but more than 600 individual stems were counted.

From an ecological perspective, the wildfire was a great success. In the absence of fire disturbance, a few individuals hang on at only the most suitable locations. After a fire they rely on significant seed reserves in the soil that allow them to effectively re-colonize previously inhospitable locations. In the years following the fire when the populations are large, massive amounts of seed are produced and deposited into the soil. Some of these seeds will continue to germinate and grow while conditions are suitable. Some seed will not immediately germinate, but will be naturally stored in the soil seed bank and await the next wildfire event.

Non-native Invasive Species

NNIS Eradication

Forest staff control invasive plant infestations each year across the Forest. In 2009, approximately 113 acres of NNIS were controlled using an integrated pest management approach. This approach relies hand pulling, cutting, herbicide use, and biological controls of purple loosestrife through the release of predatory beetles. In 2009, herbicide use was the most utilized control method. The greatest number of sites treated and the greatest number of acres controlled were both located on the Pemigewasset Ranger District. This is because the Pemigewasset District contains many small isolated infestations on NNIS and the Forest's overall prioritization strategy for NNIS prevention put a heavy emphasis on rapidly eradicating this type of infestation. The Androscoggin has very few infestations overall and the infestations on the Saco District tend to be larger and more concentrated.

District	Pemigewasset	Saco	Androscoggin
Acres	67	44	2.3
Sites	22	6	4

Most treated sites were between one-tenth of an acre and one-half acre in size. There were a handful of sites ranging from 20 to 40 acres in size. Monitoring showed that two infestations of common reed (*Phragmites australis*) that have been treated annually since 2007 were completely eradicated in 2009.

Recreation

Trail Use Monitoring

The Forest has been monitoring Forest trail use intermittently for the past 10 years. The years sampled include: 1999, 2000, 2001, 2008, and 2009.

A random sampling technique coupled with the installation of self-registration boxes at selected trailheads was chosen to provide a statistically reliable sample and cost efficient methodology for collecting trail and backcountry use data. Sampling will be conducted for one more season and the results will be analyzed and then compared to the first 3-year cycle to look for changes in visitor use patterns.

Water Resources

Forest-wide Water Resource Monitoring: 1999 to 2009 Summary

The water quality monitoring program addresses the monitoring question, “To what extent are water resources and aquatic ecosystems being maintained or restored by management activities?” Forest-wide water quality monitoring from 1999 to 2009 focused on three watersheds: the Swift River, Upper Ammonoosuc River, and Wildcat River. This monitoring provides an indicator of water quality in watersheds that provide multiple services, including timber supply, wildlife habitat, recreation, and drinking water. It also characterizes water quality in a designated Wild and Scenic River, the Wildcat River. The results of ten years of monitoring show that water quality on the National Forest is being maintained and is generally sufficient to fully support beneficial uses. This work also highlights differences in water quality between watersheds. Table W-1 presents ten-year averages for selected parameters, which are discussed below.

Assessing acidification: pH , buffering capacity and aluminum

Certain areas have low average pH and alkalinity (buffering capacity). This is particularly true in the Swift River drainage and at higher elevations within the watershed (Figure W-1). New Hampshire water quality standards specify pH should be 6.5 to 8.0, unless naturally occurring. However, many sites across the Forest have values below 6.5 (Hornbeck et al. 2001). These conditions are likely due to a combination of factors including geology, naturally-occurring organic acids and acid deposition. Special attention is being given to identification and monitoring of acid-sensitive watersheds.

Swift River and Upper Ammonoosuc River sites have average total aluminum concentrations that exceed the New Hampshire freshwater chronic criterion for aquatic life of 0.087 ppm. This result is consistent with data collected at stream sites across the Forest between 1953 and 1999 (Hornbeck et al. 2001); the average across these sites was 0.164 ppm, with 78% of sites exceeding 0.087 ppm even when acidic ponds were excluded. Aluminum is a naturally-occurring element that is mobilized under acidic conditions. Thus, the high aluminum concentrations tend to correspond to low pH, and are likely caused by the same factors (Figures W-2 and W-3). Since not all forms of aluminum are detrimental to

aquatic life, future monitoring will investigate the prevalence of harmful forms of aluminum.

Conductivity, chloride and turbidity

Conductivity measures the ability of a water sample to pass electrical current. This measurement captures all dissolved substances, but especially high values can be an indicator of contaminants such as road salt. There is no water quality standard for conductivity, but the State of New Hampshire suggests that values below 100 $\mu\text{S}/\text{cm}$ are normal for unimpaired waters in this region (NH VRAP 2008). Conductivity in monitored streams is generally below the level indicative of impairment. Chloride concentrations, another indicator of road salt input, are also far below the freshwater chronic criteria of 230 ppm.

Turbidity reflects the amount of suspended particles in the water. Turbidity is naturally low on the National Forest, but may increase during storm events or due to runoff from disturbed areas. An average of less than 1.5 NTU across watersheds reflects the clarity of the water on the Forest, particularly since monitoring equipment used from 1999 to 2003 likely overestimated turbidity values at the lower end of the range.

Bacteria

Samples were analyzed for a non-pathogenic strain of *Escherichia coli* (*E. coli*), an indicator bacterium which can signal the presence of human or animal waste. Average bacteria counts generally met the Class A water quality standards of less than 153 counts per milliliter in any one sample. However, two sites on the Upper Ammonoosuc River did not meet the Class A standard on two to three dates. Both of these sites are in wetlands and the higher bacteria counts have been attributed to wildlife abundance. A downstream municipal water supply had no drinking water violations during the sample period, so water treatment appears to effectively mitigate any risk from bacteria present upstream. The presence of coliform bacteria in relatively undisturbed, apparently healthy watersheds highlights the need to educate backcountry recreationists about safe drinking water practices.

Bacteria counts also exceeded the Class A Standard on one date in 2004 for a Swift River site below Lower Falls. This result raises some concern due to use

Figure 28. WMNF hydrologist Sheela Johnson takes a water sample from an unnamed Stevens Brook tributary. WMNF photo by Steve Jones.



of the Lower Falls area for water-based recreation. However, similarly high values were not found on any of the 35 other sample dates. The high degree of variability in the data highlights the challenge of identifying bacteria-impaired sites and understanding the source of bacteria where they occur.

Nutrients

Phosphorus and nitrogen are “limiting” nutrients that may be indicators of pollution from human and animal waste, fertilizers, sediment and other sources. Nitrate and phosphorus levels were low in each watershed (Table 3). This is the expected result in watersheds with little development and healthy vegetation. It should be noted that the mean phosphorus concentration reported here excludes outlying points from one month in 2003, which are thought to result from laboratory error or sample contamination.

Table 3. Mean values for water chemistry parameters in three WMNF watersheds, 1999-2009.

Parameter	Water Chemistry by Watershed					
	Swift River		Upper Ammonoosuc River		Wildcat River	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
pH (standard units)	6.4	0.4	6.8	0.3	6.6	0.3
Alkalinity (mg/L as CaCO3)	2.5	1.2	6.1	2.4	3.3	1.4
Total Aluminum (ppm)	0.258	0.163	0.151	0.084	0.081	0.038
Conductivity (uS/cm)	32	14	26	5	23	9
Chloride (ppm)	3.24	3.29	0.37	0.15	1.55	1.59
Turbidity (NTU)	0.8	0.5	1.3	0.9	0.7	0.4
Nitrate (ppm)	0.85	0.57	0.19	0.21	0.10	0.17
Phosphorus (ppm)	0.003	0.008	0.008	0.007	0.005	0.005
E. coli (counts/100 mL)	7	48	59	114	4	6

Average pH at Swift River Sites, 1999-2009

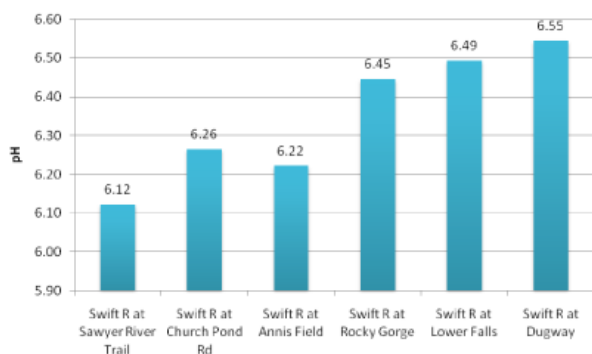


Figure 29. Average pH at Swift River sites from 1999 to 2009. Sites are listed in order from upstream to downstream.

Average Total Aluminum at Swift River Sites, 1999-2009

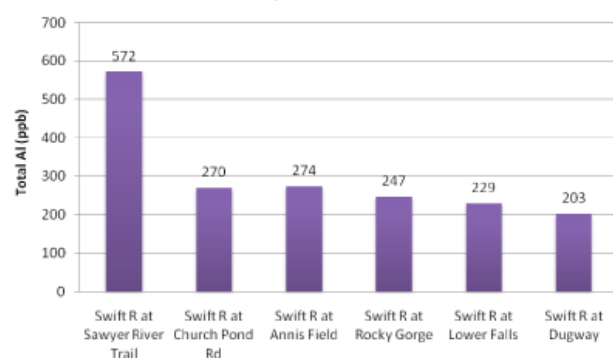


Figure 30. Average total aluminum, in parts per billion, at Swift River sites from 1999 to 2009. Sites are listed in order from upstream to downstream.

Wilderness

The WMNF Wilderness Plan (Forest Plan, Appendix E) is designed to assure the Forest maintains a balance among primitive recreation, ecological integrity, and other wilderness values, even in the context of a heavily used urban national forest. It provides specific monitoring protocols consistent with a modified Limits of Acceptable Change (LAC) process as a means of ensuring that different values are managed consistent with the Wilderness Act

In 2009, the Forest continued collecting data to look at campsite density, campsite size, visitor trail use, and visitor destination use. Using Forest Service staff, two individual volunteers, and volunteers from Wonalancet Outdoor Club, sampling was conducted throughout the summer in all Wildernesses. This was the third year of campsite monitoring; data analysis will take place in 2010. FY09 was the first year of a three-year cycle of collecting visitor use data. At the conclusion of this cycle, we will compare the data to a previous three-year cycle and examine any trends or changes.

Figure 31. Hikers in the Alpine Zone near Mount Washington's summit..WMNF photo by Sarah LaPlante.



Wildlife

Bat Monitoring

The White Mountain National Forest has had a focused interest in woodland bat populations since the late 1990s. Traditionally, WMNF bat populations have been monitored using mist nets to capture bats and identify them by hand. In the past ten years, a number of these surveys have been completed, providing information on species presence/absence, reproductive condition, and demographic information for the Forest's woodland bats. However, the sudden appearance and rapid spread of white-nose syndrome since 2006 across the northeastern U.S. has caused a change in how biologists are now approaching bat monitoring.

Because of high mortality rates and presumed bat-to-bat spread of white-nose syndrome, the U.S. Fish and Wildlife Service has recommended avoiding unnecessary surveys where bats may come into contact with each other. Although WMNF mist net surveys have rarely, if ever, resulted in bats contacting each other in the net, they may inadvertently pick up spores or other infectious material from equipment such as nets, gloves being used by researchers, holding bags, etc. In addition, temporary capture undoubtedly causes some amount of increased stress to bats before they are released.

Instead, bat experts recommend acoustic monitoring, which uses specialized equipment to detect the ultrasonic calls bats use to navigate and locate prey. In this way, an estimate of bat activity can be gauged just as birds are monitored through listening for their songs. In 2009, the WMNF joined a number of other National Forests and partners across the eastern U.S. to implement a newly developed survey. By applying the same protocol in multiple areas, biologists hope to be able to gain an understanding of bat levels over large regional areas. By repeating this monitoring in future years, changes in bat populations in summer habitats can be determined.

Five transects were placed at least partly on WMNF land in areas that were considered good bat habitat (relatively open, flat conditions). Each transect consists of a road or series of roads that are slowly (20 mph) driven at night with the bat detector strapped to the roof of the vehicle. The WMNF is somewhat limited because of its mountainous terrain and lack of suitable roads. For safety's sake, only roads that could be safely driven at 20 mph were considered (e.g., only low volume roads, not major highways). Each transect was completed three times over the course of the summer and all data was submitted to be analyzed by a contracted bat expert. Table 4 summarizes the data collected from this survey.

Table 4. WMNF acoustic bat calls from driving surveys, 2009

Transect	Miles	Date	Big brown bat OR silver-haired bat*	Red bat	Hoary bat	Little brown bat	Total bat calls
Hwy 113 (ME)	28.2	6/24	26	13	3	39	81
		7/6	42	9	6	42	99
		8/6	55	6		50	111
Bog Dam Rd (NH)	19.7	6/30		6		26	32
		7/9		10		11	21
		8/13	3	6		127	136
Tripoli Rd/ Hwy 49 (NH)	20.1	6/25	11		7	4	22
		7/10	19	3	13	11	46
		7/22	28	5	15	15	63
Stinson Lake (NH)	22.1	6/17	5	3	4	5	17
		7/5	3	2	2	17	24
		7/20	4	5	5	25	39
Hwy 112 (NH)	21.7	6/22	29	5	14	9	57
		7/5	29	5	11	7	52
		8/4	31	18	9	46	104

*These two species are sometimes difficult to differentiate accurately, so are often lumped together for analysis purposes

Transects were completed as far south as the Florida panhandle and as far west as Oklahoma and Minnesota. In terms of bat activity, the WMNF compared well to other survey sites, despite having confirmed white-nose syndrome sites in Grafton County, NH and just over the border in neighboring Vermont. However, the two Grafton County transects (Tripoli Rd. and Stinson Lake) had generally lower numbers than the other transects. This may be the result of white-nose syndrome or perhaps the lower numbers are due to transect dates that are earlier than the others. For all transects, the third replicate showed the highest numbers of bats detected, but Tripoli Road and Stinson Lake had third replicates in July, while the others were conducted in August. Migrating bats moving through the WMNF may have temporarily swelled the population later in the summer.

WMNF staff also initiated a separate but similar monitoring effort, setting up stationary bat detectors at sites with previous acoustic survey data. These were sites where mist net and acoustic surveys had been completed during 2002 and 2004 (prior to the onset of white-nose syndrome) and it was hoped that comparing this earlier data with 2009 data might elicit some useful information. A total of 11 sites were surveyed for approximately 3 hours at night during the summer using the same equipment as on the driving surveys. Table 5 shows a summary of the data collected at these stationary sites.

Table 5. Summary of WMNF stationary acoustic bat survey data, 2009.

Site	District	Survey date	Total bat files*
Godfrey Dam	Andro	7/15/09	123
Wild River	Andro	7/20/09	87
East Royce Marsh	Andro	7/22/09	49
Spring Brook wildlife opening	Andro	7/30/09	235
Basin Road	Saco	7/24/09	19
Basin Pond	Saco	7/26/09	177
Cave Mountain	Saco	6/17/09	17
Passaconaway	Saco	7/28/09	348
Elbow Pond	Pemi	6/24/09	76
Rumney Rocks Parking Lot	Pemi	8/5/09	109
Lake Tarleton	Pemi	8/14/09	80

*Bat files at a stationary site cannot be assumed to be different individuals, but can be used as a measure of general bat activity at a particular site.

Unfortunately, the earlier contracted data from 2002 and 2004 did not indicate start and stop times for acoustic monitoring, so direct comparisons about abundance can't be made. However, the level of activity in general at many of these sites is encouraging. Although individual files have not all been identified to species level, we are confident that the vast majority of files are from little brown bats, with at least 10 percent being big brown bats or silver-haired bats. In general, species that were present in earlier surveys appear to have been present in 2009. There were some cases where species were found in earlier surveys at some sites, but not in 2009 and vice versa, but no obvious patterns emerged. Plans are to repeat these surveys on an annual basis to follow trends over time.

Figure 32. Forest Service vehicle equipped with Anabat bat detector in a watertight container on the roof. WMNF photo by Leighlan Prout.



Monitoring and Research by Partners and Cooperators

A wide variety of short- and long-term inventory, monitoring, and research studies are conducted every year on the White Mountain National Forest by individuals, organizations, and universities. In FY09, this work included surveys for orchid and butterfly species, soil development, seed collection for seed banks, population dynamics for several species of wildlife and plants, and structural geology, among other topics. All proposals for non-Forest Service research and monitoring on the Forest are logged in a research database and reviewed by appropriate specialists before a permit is issued. Often limitations are placed on the location, type of activity, or intensity of work that can occur on the WMNF to ensure that resources are protected and Forest Plan direction is applied. Project proponents are expected to provide a summary of work done or copies of any reports generated by activities on the WMNF so the Forest will have access to any information that could help us in our management.

In recent years, many of the monitoring and research projects have been designed to help answer questions related to climate change. In FY09, studies looked at cloud and rain chemistry, air quality, weather, timing of leaf-out and plant development at various elevations, alpine pond conditions, past climate as indicated by tree growth, changes in alpine/subalpine community composition, adaptability of non-native species, and alpine plant population size, phenology, and range shifts. Answering questions about how the local climate is changing and how those changes are affecting natural resources will require analysis of data from across several decades. Much of the work being done on the WMNF will be a part of that effort. These studies will provide us with real-time information as changes occur so we can evaluate whether to adjust our management.

Literature Cited

Donovan, T.M. and M. Alldredge. 2007. Exercises in estimating and monitoring abundance. Available at <<http://www.uvm.edu/envnr/vtcfwru/spreadsheets/abundance/abundance.htm>>. Accessed January 12, 2010

Hines, J.E. 2006. PRESENCE2 — Software to estimate patch occupancy and related parameters. USGS-PWRC. Available at <<http://www.mbr-pwrc.usgs.gov/software/presence.html>>.

Hornbeck, J.W., M.M. Alexander, C. Eager, J.Y. Carlson, R.B. Smith. 2001. Database for Chemical Contents of Streams on the White Mountain National Forest. USDA Forest Service Northeastern Research Station General Technical Report NE-282. <<http://www.treesearch.fs.fed.us/pubs/3757>>.

Johnson, S.M. 2009. Overview of Possible Effects of Climate Change to Water Resources in the White Mountain National Forest. USDA Forest Service, White Mountain National Forest, unpublished.

New Hampshire Volunteer River Assessment Program (NH VRAP). 2008. Interpreting VRAP Water Quality Monitoring Parameters. New Hampshire Department of Environmental Services. Accessed March 24, 2010 at <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/vrap_parameters.pdf>

Figure 33. Looking south along the Franconia Ridge Trail from the summit of Mt. Lafayette. WMNF photo by Forrest Seavey.



